

## High Torque, Direct Drive Electric Motor, Phase II

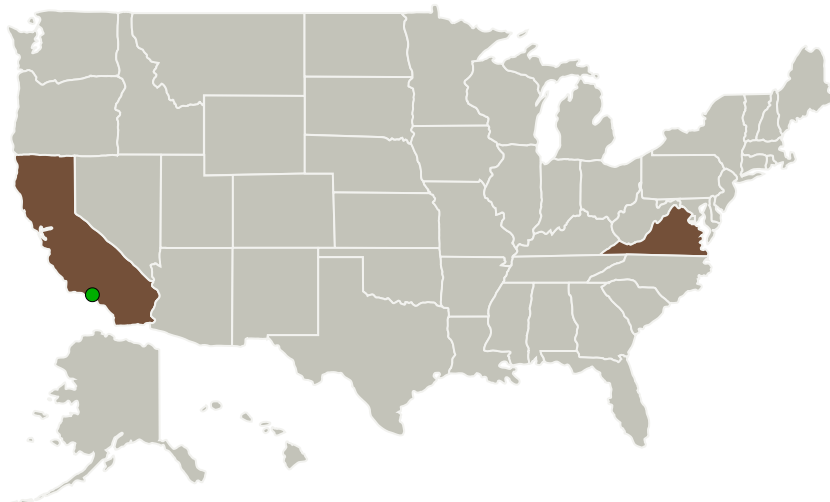
Completed Technology Project (2011 - 2013)



## Project Introduction

Bear Engineering proposes to advance the development of an innovative high torque, low speed, direct drive motor in order to meet NASA's requirements for such devices. Fundamentally, all electric motors basically work on the same electromagnetic principle: a tangential electromagnetic force attracts the rotor to the stator. Just when the rotor field is closest to the stator field and the electromagnetic attraction is greatest, the power is interrupted and another set of magnetic poles repeats the cycle. Furthermore, the two magnetically attracted elements never make contact, which would otherwise offer the highest force of attraction. The proposed novel motor design, successfully demonstrated at TRL 4 in Phase 1, operates and behaves entirely differently from all other known electric motor designs and is capable of producing incredibly high, direct drive torques at low rotational speeds. Its operational performance is similar to that of a stepper motor with a 1000:1 gearhead attached, but the similarity ends there. The motor is configured such that its length to diameter aspect ratio is opposite that of traditional motors as it has a relatively large diameter and short axial length; this offers all new packaging opportunities. The design also allows for a single, large diameter bearing pair to be used for the motor's output shaft which renders it stiff enough to directly mount the driven elements. The need for additional bearing supports and bearing mounting structure is thus eliminated. By the end of Phase 2, the system will be designed, developed and tested at TRL 6 with Mars environmental conditions.

## Primary U.S. Work Locations and Key Partners

High Torque, Direct Drive  
Electric Motor, Phase II

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Organizations Performing Work	Role	Type	Location
Bear Technologies, LLC	Lead Organization	Industry Small Disadvantaged Business (SDB)	Oilville, Virginia
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

California	Virginia
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## Project Transitions

**June 2011:** Project Start**June 2013:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138943>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Bear Technologies, LLC

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Thomas Myrick

**Co-Investigator:**

Thomas Myrick

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### Technology Maturity (TRL)

Start: 4  
Current: 6  
Estimated End: 6



### Technology Areas

#### Primary:

- TX04 Robotic Systems
  - └ TX04.2 Mobility
    - └ TX04.2.2 Above-Surface Mobility

### Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System